

Applicant gratefully acknowledges the Examiner's indication at item 10 of the Office Action that claims 44-49 contain allowable subject matter and would be allowed if rewritten in independent form including the limitations of the base claim and any intervening claim, and to overcome the rejection under 35 USC 112, second paragraph.

Amendments Presented

Independent claim 29 has been amended by incorporating limitations of dependent claims 27, 30, 31, 33, 34. Correspondingly claims 30, 31, and 34 have been canceled without prejudice and without dedication or abandonment of the subject matter thereof. Further claims 29, 32 are amended by changing the language "laminated metal sheets" to --- stacked metal sheets--- for consistency with the original disclosure.

Also, many of the dependent claims have been amended to be consistent with the amendments to claim 29 and the cancellation of claims 30, 31, 34, and to more particularly point out and distinctly claim the subject matter which applicant regards as the invention, including changes which to the language "the axial direction", "the serial direction", and "the parallel direction" as addressed by the Examiner in the rejection under 35 USC 112, second paragraph.

Applicant respectfully submits that the above amendments are fully supported by the original disclosure including the specification and claims. For example, the modifications to claims 39, 41, 43, 45, 47 involving "an electrically serial direction" and "an electrically parallel direction" are supported by the discussion in paragraph [0026] and FIGS. 9-11 of the original specification. Further, the change from "laminated" to ---stacked--- is supported by the discussion in paragraph [0024] of the original specification.

Applicant also submits that no new matter is introduced into the application by the above amendments, since all of the subject matter thereof was expressly or inherently disclosed in the

specification and claims, as originally filed.

Response to Office Action

The above-identified Office Action has been reviewed, the references carefully considered, and the Examiner's comments carefully weighed. In view thereof, the present Amendment is submitted. It is respectfully submitted that by the present amendment, all bases of rejection set forth in the outstanding Office Action have been traversed and overcome. Accordingly, reconsideration and withdrawal of the rejection of record is respectfully requested.

Restriction Requirement

Applicant notes that the previously imposed restriction requirement has been made final at item 1 of the Office Action, whereby claims 25-28 and 50 stand withdrawn from consideration.

Objection To Specification

At item 2 of the specification the Examiner has objected to the specification as failing to provide a proper antecedent basis for the subject matter of claims 30-32 involving "stacked metal sheets".

Applicant's Response

In view of the above amendment to the claims 29, 32 changing "laminated" to ---stacked--, it is believed that the objection is overcome, and accordingly it is respectfully requested that the objection be reconsidered and withdrawn.

Claim Rejection – 35 USC 112, Second Paragraph

At item 4 of the Office Action the Examiner has rejected claims 38-41, 43, 45, 47, and 49 under 35 USC 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Particularly, it is the Examiner's opinion

that the language “the axial direction”, “the serial direction”, and “the parallel direction” as used in these claims lacks sufficient antecedent basis, and the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Applicant's Response

Upon careful consideration and in light of the above modifications to claims 38-41, 43, 45, 47, and 49, applicant respectfully submits that the rejection is overcome, and that these claims are definite within the guidelines of 35 USC 112, second paragraph, because persons of ordinary skill in the art would clearly understand the subject matter which applicant regards as the invention, when the claim language is considered in light of the corresponding discussion in the original specification, including paragraph [0026] with reference to FIGS. 9-11.

Accordingly applicant respectfully requests that the rejection be reconsidered and withdrawn.

Claim Rejections – 35 USC §102, §103

1. At item 6 of the Office Action, claims 29 and 36-43 stand rejected under 35 USC 102(e) as being anticipated by Draper et al. (US Patent Publication 2004/0234830).

It is the Examiner's opinion that: Draper's combination nickel foam expanded nickel screen electrical connection supports for solid oxide fuel cells meets all the limitations of the rejected claims; and that the limitation of claim 37 is product-by-process and is not given patentable weight. The Examiner also references to Draper's FIGS. 4-5 and paragraphs [0006], [0007], [0040], [0044].

2. At item 8 of the Office Action, claims 30-32 stand rejected under 35 USC 103(a) as being unpatentable over Draper et al. It is the Examiner's opinion that: relative to claim 30 it would have been obvious to laminate a plurality of metal sheets on top of each other as an obvious

duplication of parts; and relative to claims 31, 32 the limitations thereof are product-by-process and not given patentable weight.

3. At item 9 of the Office Action, claims 33-35 stand rejected under 35 USC 103(a) as being unpatentable over Draper et al. in view of Shigehisa (JP 11-025999). It is the Examiner's opinion that: Draper does not teach an electrically conductive member in the form of a folded metal sheet; Shigehisa teaches a solid electrolyte fuel cell including an electrically conductive member 10 which is folded from a single sheet with a larger contact area so that contact resistance is attained; it would have been obvious to persons of ordinary skill in the art at the time of the invention to modify the shape of Draper's nickel foam material and replace the inter connector with a folded conductive member such as taught by Shigehisa to thereby be one piece and reduce contact resistance.

Applicant's Response

Upon careful consideration and in light of the above modifications to claim 29, applicant respectfully submits that all of the above rejections are overcome, and that each of present claims 29, 32, 33, and 35-43 patentably distinguishes over the Draper and Shigehisa references (whether considered singly or in combination) because the fuel stack as now defined by independent claim 29 possesses unique features which make the fuel cell stack very advantageous in terms of improved maintainability of a fuel cell stack, whereas the fuel cell structures of Draper and Shigehisa do not possess such features and do not achieve the improved maintainability achieved by the claimed invention.

According to the invention of present claim 29, the folded or stacked part of the metal sheet(s) "...undergo separation from the interface of the folded or stacked part of the metal sheet after baking or power generation". As described in paragraph [0012] of the

specification, particularly the last sentence thereof, such structure is very advantageous in that, even after baking or power generation, separation easily takes place at the interface and, thus, maintainability is excellent. Specifically, as also described in paragraph [0029] of the present specification, the layers are easily separated from each other from the interface created by folding or stacking of the metal sheet indicated by 6a in FIG. 5 by inserting a sword point-shaped file or the like between the layers. The paragraph also explains that “[b]y virtue of this, after baking or power generation, malfunction, for example, due to a failure of contact between a part of

the fuel cells and the electrically conductive member can easily be repaired, and the replacement thereof is also easy and, further, the fuel cell can easily be replaced on a cell basis.” Thus, the fuel-cell stack using the electrically conductive member according to the present invention is very advantageous in improved maintainability as compared to conventional solid oxide fuel cell stacks. None of the references cited discloses or suggests this meritorious effect.

In this regard, applicant has considered the Examiner’s several references to process-by-product limitations in the claims to which the Examiner is giving no patentable weight, and applicant respectfully traverses the Examiner’s position because : 1) the limitations involving “separation from the interface of the folded part of the metal sheet, or of the stacked metal sheets, after baking or power generation” are not strictly product-by-process limitations, but rather are limitations *defining structural characteristics of the layered structure* which has been baked or involved in power generation (e.g., at 800-1000°C); and some of the limitations (claims 32, 35) define thickness of the folded metal sheet, or of the stacked metal sheets, which has nothing to do with a process. The Examiner must give patentable weight to these limitations under 35 USC 102, 103.

Applicant respectfully submits that this meritorious effect achieved by the presently claimed is not provided or suggested by the conductive member disclosed in the Shigehirsa reference. In paragraph [0022] of the reference, the conductive member is metal fiber aggregate and has a density of 0.44 - 2.21 g/cm³. Further, in Shigehisa's paragraph [0030], in the working examples, the conductive member having a density of 0.88g/cm³ was used. By analogy, in the comparative example described in paragraphs [0040] to [0042] of the specification, the conductive member which is a metal fiber aggregate containing Ni as the main component, i.e., nickel felt, and has a density of 0.50 to 1.50 g/cm³ was used. The nickel felt was folded and used as an electrically conductive member of fuel cell stack. After a power generation, the interface of the stacked part of the conductive member is sintered and integrated so that a fuel cell was not removed easily. Hence, the comparative example of the present application, like the conductive member of Shigehisa, does not possess / achieve or make obvious the separation feature now recited at the last clause of claim 29, i.e., "the layered structure of the folded or stacked metal sheets undergo separation from the interface of the folded or stacked part of the metal sheet after baking or power generation."

On the other hand, example 1 of the specification of the present case shows good separation as defined in claim 29, which results in the improved maintainability of the fuel cell stack.

The Draper reference does not overcome the deficiency of the Shigehisa reference. For example, Draper et al. do not disclose a three-dimensional porous structure of a continuous skeleton of which the axis diameter is in the range of 35 to 80 micro meters. Draper also fails to disclose or suggest a folded or stacked layer structure as required by claim 29, and hence is also fails to suggest of make obvious the result that the layers are easily separated from each other

from the interface created by folding or stacking of the metal sheet according to the presently claimed invention.

Based on the foregoing, applicant respectfully submits that the rejections of claims 29-43 based on the Draper and Shigehisa references are overcome in relation to present claims 29, 32, 33, and 35-43. Accordingly, it is respectfully requested that the rejections be reconsidered and withdrawn.

Conclusion

Applicant respectfully suggests that as presently amended, all of the pending claims are allowable. For all of the above mentioned reasons, Applicant requests reconsideration and withdrawal of the rejection of record, and allowance of the pending claims. Further, it is applicant's contention that none of the references of record, considered either individually or in any reasonable combination, can be viewed as teaching applicant's claimed invention.

The application is now believed to be in condition for allowance and a notice to this effect is earnestly solicited.

If the Examiner feels that the prosecution of the present application could be expedited by a telephone discussion, applicant's undersigned representative would be gladly willing to conduct a telephone interview to resolve any issues remaining in the prosecution of the application.

Favorable reconsideration is respectfully requested.

Respectfully submitted,



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Enclosures